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AN ULTRASONOGRAPHIC COMPARISON OF EYE LENS SIZE BETWEEN THE NEW ZEALAND WHITE RABBIT AND THE MIXED PERSIAN RABBIT

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ABSTRACT

Background and Objectives: Nowadays, ultrasonography is considered as one of the main procedures performed in optic examinations, leading to the detection of various complications and the diagnosis of different diseases; complications which are caused by changes in the structure and size of the eye's components. In order to perform a beneficial ultrasonography, it is essential to be aware of the size of the eye's components in their natural state. ?. The objective of this study is to compare the size of a natural and healthy optic lens in two species of rabbits, the mixed Persian rabbit and the white New Zealand rabbit, and to determine whether or not a significant difference exists between the two.

Study Plan: Ultrasonography is to be performed on the optic lens of two groups of rabbits. The results will be studied using analytical methods.

Animals: 8 new zealand wite rabbits and 8 mixed Persian rabbits

Methods: Transcorneal ultrasonography was performed using a linear 6-12 megahertz Sonosite Titan transducer. Using the gathered images, the size of the optic lens was measured and recorded. The results were statistically analysed using the SPSS software.

Finds: A significant difference is present between the size of the optic lens in the white New Zealand rabbits and the mixed Persian rabbits.

Conclusion and Clinical Application: The size of the optic lens of a white New Zealand rabbit was measured as 0.58± 0.009, while the size of the same optic component in mixed Persian rabbits was measured as 0.69 ± 0.039، ($P<0.001$).

The finds of this study may be used in studying the complications and diseases pertaining to the optic lens in mixed Persian rabbits.

KEYWORDS: Rabbit, Optic Lens, Ultrasonography

INTRODUCTION

In both humans and animals, ultrasonography may be used to examine the eye and its orbit. In order to perform an ultrasonography on the eye, a transducer with a frequency higher than 7.5 megahertz is required. In addition, a system capable of recording images in the form of brightness modes and Amplitude modes is also essential. ultrasonographic unit which used for echocardiography and abdominal ultrasonography with higher frequencies than 7.5 MHz may also be used

to study the optical orbit and its components in animals. Sector and linear transduser or a combination of the two may be used to perform optic sonographies ultrasonographic study.

In general ultrasonography of the optic area does not require the use of stand-off. However, when the anterior compartments are being examined using sector transducers, it is recommended to use stand-off (2 & 6).

Two procedures are mainly used to perform ultrasonography on the eyes (6):

- By placing the transducer on the palpebra (trans-palpebral). Due to the longer distance and the probable presence of air between the eyelid and the eye itself, more artifacts tend to be present in the final result.
- By placing the transducer on the cornea itself (trans-corneal). In this method, the transducer is placed directly on the cornea, using a gel medium. The use of sterile gels is recommended; however, non-sterile gels may also be used, under the condition that the eyes are thoroughly cleansed after performing ultrasonography.

The eye may be examined from three angles view: dorsal and sagital and transverse view. It should be mentioned that if the eyeball is located deep within the socket pupil or that the animal has received anaesthetics, it will be difficult to attain the transverse view. In case the subject proves to be resistant, local anaesthetics such as procaine 0.5% or weak general anaesthetics may be administered. It is notable to mention that in case of administrating general anaesthetics, the third third eyelid may poalpsed, leading to difficulties in imaging processes (2).

Optic ultrasonography has been performed in both humans and animals, such as the white New Zealand rabbit, and the resulting measurements are used in research studies, as well as clinical diagnosis. However, no record concerning the size of the optic lens of Persian mixed rabbits exists, and prior to this study, the size of the optic lens of white New Zealand rabbits was used as a reference in such studies, which in turn, may be considered an egregious error. This study sets to determine the size of the optic lens of Persian mixed rabbits.

MATERIALS AND METHODS

- **Required Material and Equipment**
  - An ultrasonograph (ultrasonographic machine)
  - A 6-12 megahertz linear transducer
  - Ultrasonography gel
  - 8 white new Zealand rabbits and 8 mixed Persian rabbits
  - A radiograph (radiographic machine)
- **Methods**

Eight mature white New Zealand rabbits and eight mature mixed Persian rabbits were obtained from a rabbit care centre. The maturity of the rabbits was determined using a radiograph and by examining the epiphyseal growth plates (determining their closure and therefore, the end of the growth period of the subjects). In order to ascertain the health of the rabbits, the subjects were kept in individual cages for two weeks, during which their food diet consisted of dried pallets and lettuce leafs. At the end of this period, the eyes of the subjects were examined by a specialist, making sure that they were all in a healthy state. Corneal contact Ultrasonography was performed using a linear 6-12 megahertz Sonosite transducer,

without the administration of any local or general anaesthetic. All of the required measurements were carried out by a veterinary radiology specialist, on the images gathered from the different components of the eye, such as the optic lens, anterior and posterior capsules and the optic disk, which are all aligned with each other (Figure 1 & 2).

The results of these measurements were statistically analysed using the independent sample T-test.

Figure 1: Optic Sonograms of White New Zealand Rabbits

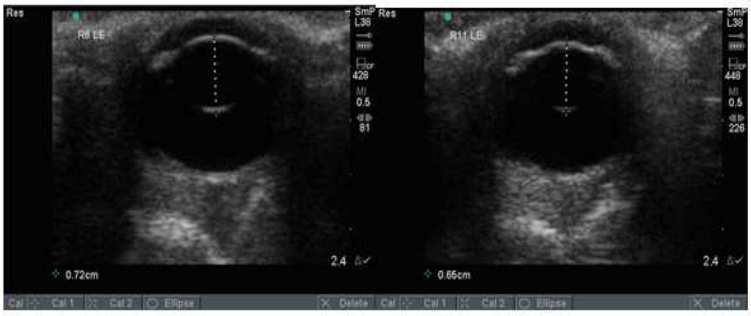

Figure 2: Optic Sonograms of Mixed Persian Rabbits

RESULTS

The results of this research are as follows:

Table 1: Measurements of the Optic Lens in Mixed Persian Rabbits

Rabbit No.	Weight (grams)	Size of the Right Optic Lens (cm)	Size of the Left Optic Lens (cm)
1	1300	0.68	0.69
2	1500	0.75	0.75
3	1400	0.71	0.70
4	1500	0.72	0.72
5	1400	0.7	0.7
6	1100	0.65	0.65
7	1000	0.67	0.67
8	1000	0.67	0.67

Table 2: Measurements of the Optic Lens in White New Zealand Rabbits

Rabbit No.	Weight (grams)	Size of the Right Optic Lens (cm)	Size of the left Optic Lens (cm)
1	1500	0.59	0.6
2	1600	0.59	0.59
3	1500	0.59	0.59

Table 2: Contd.,			
4	1400	0.57	0.57
5	1300	0.58	0.58
6	1600	0.59	0.59
7	1500	0.58	0.58
8	1600	0.6	0.6

In mixed Persian rabbits the size and standard deviation of the right optic lens was 0.69±0.032 and that of the left optic lens was 0.69 ± 0.031 (P=1.00). The aforementioned parameters for the right and left optic lens of white New Zealand rabbits ware measured as, regarding their order, 0.58± 0.009 and 0.58 ± 0.010 (P=0.8). In mixed Persian rabbits, the average size and standard deviation of the both left and right optic lenses was determined as 0.69 ± 0.031. the average size and standard deviation for left and right optic lenses of white New Zealand rabbits was measured as 0.58 ± 0.009 (P<0.001).

DISCUSSIONS

Eye measurement using ultrasonography techniques in various livestock indicates that the size of the eye and its various components differ from one animal to another. This difference may also be seen in an interspecific level. For example, a research which used ultrasonography to study the eye and its components in Jersey and Holstein cows, determined that the size of the eye itself is considerably larger in Holstein species, while the optic lens is larger in Jersey cows (5). Since the authors of this paper are fully aware that no significant difference is present concerning the size of the optic compartment in various human races, and by considering the studies reporting a 24 micron growth per year between ages 16 and 65, it may be concluded that the growth of the human eye, even for 40 continuous years, is not able to cause a significant difference in the size of this structure between the young and the elderly (4).

The size of the optic compartment varies in canines with different skull structures. The size of this compartment is considerably larger in long jawed species than in those who possess medium sized jaws. However, the size of the optic lens is equal in both species (3). Based on these reports, it may be concluded that the measurements performed on the optic lens of white New Zealand rabbits may also be extended to that of other rabbits, such as the mixed Persian rabbit. However, the results of the at hand research denies this conclusion and proves that ,considering the lesser weight and size of mixed Persian rabbits, the size of the optic lens in the white New Zealand rabbits is also different from that of the aforementioned species, and significantly so (1).

The main reason to this difference is not well determined. Since the general shape and size of the skull of various species and subspecies of rabbit are mostly the same, it was also assumed that the size of their optic lens should also be of the same value. However, this assumption was proven to be false by the measurements and results of this study, clearly indicating a significant difference between the sizes of the two.

In order to determine the main reason to this variation, it is recommended that other studies should also be carried out; studies which set to measure the size of the various components of the optic compartment.

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